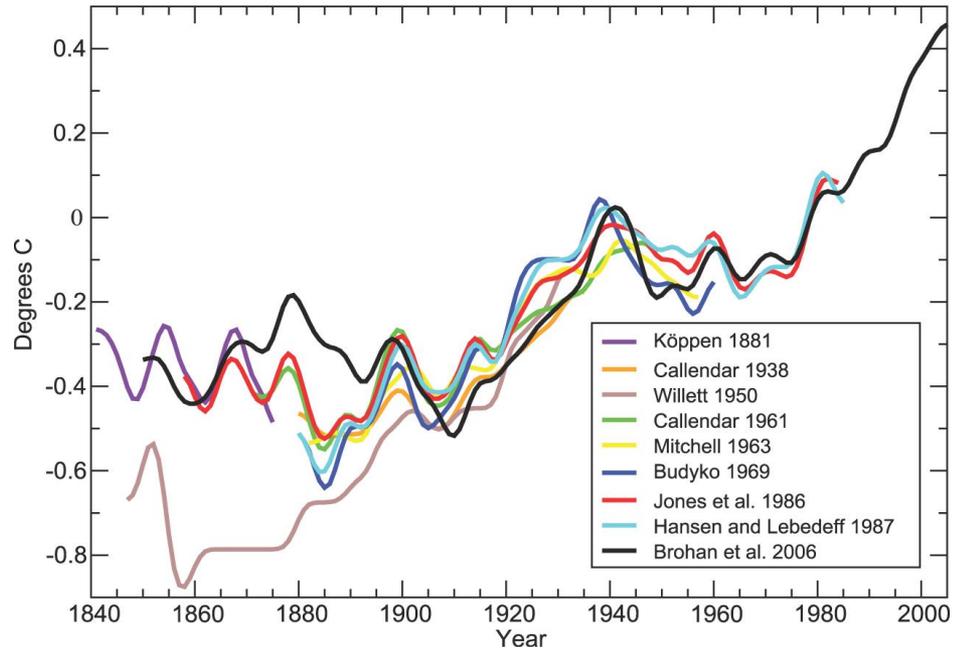




Thinking about Trails and Habitat in an era of Climate Change

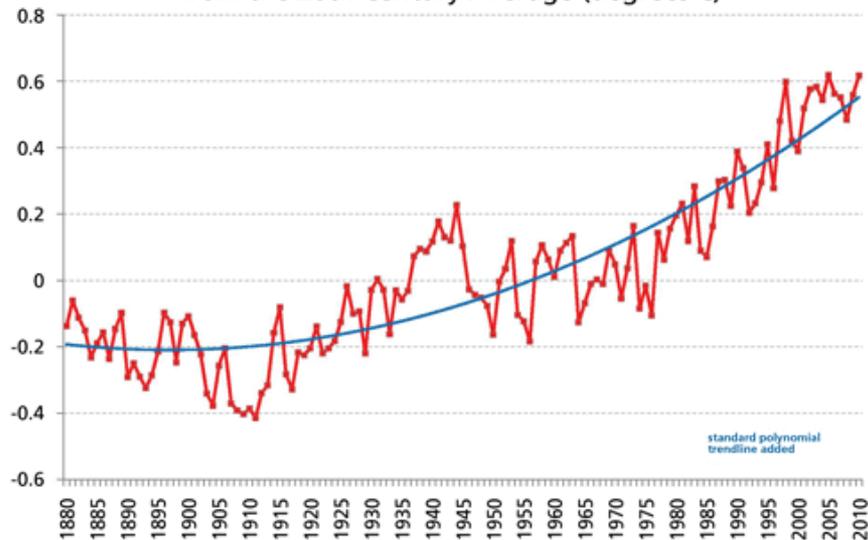
Jay Chamberlin
Natural Resources Division
California State Parks

Global Temperature Time Series



IPCC 2007

Global Temperature Changes from the 20th-Century Average (degrees C)



NOAA 2011

Extreme Weather & Catastrophic Events



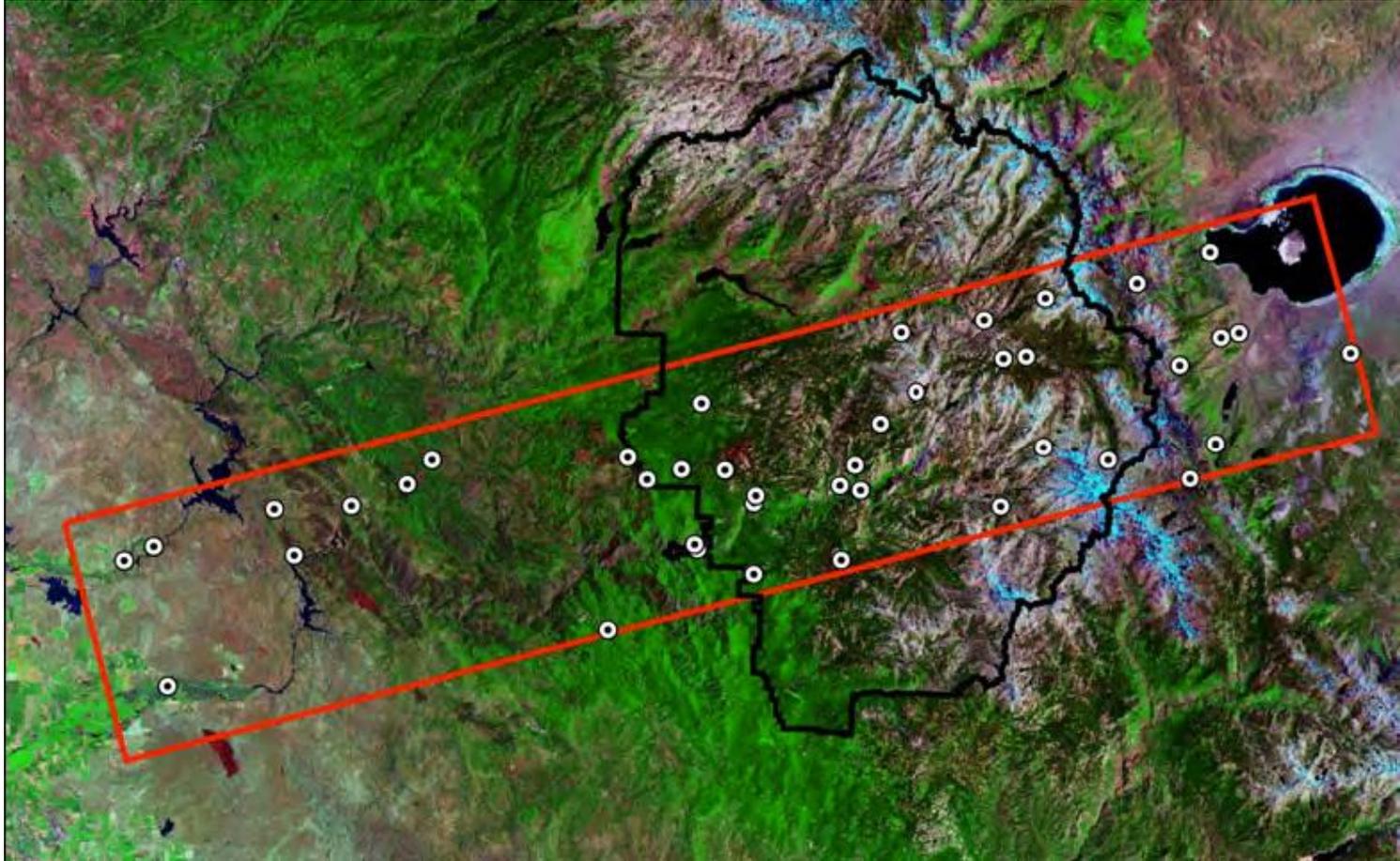
Menahem Kahana/Agence France-Presse, Getty Images



Mark Wilson, Getty Images

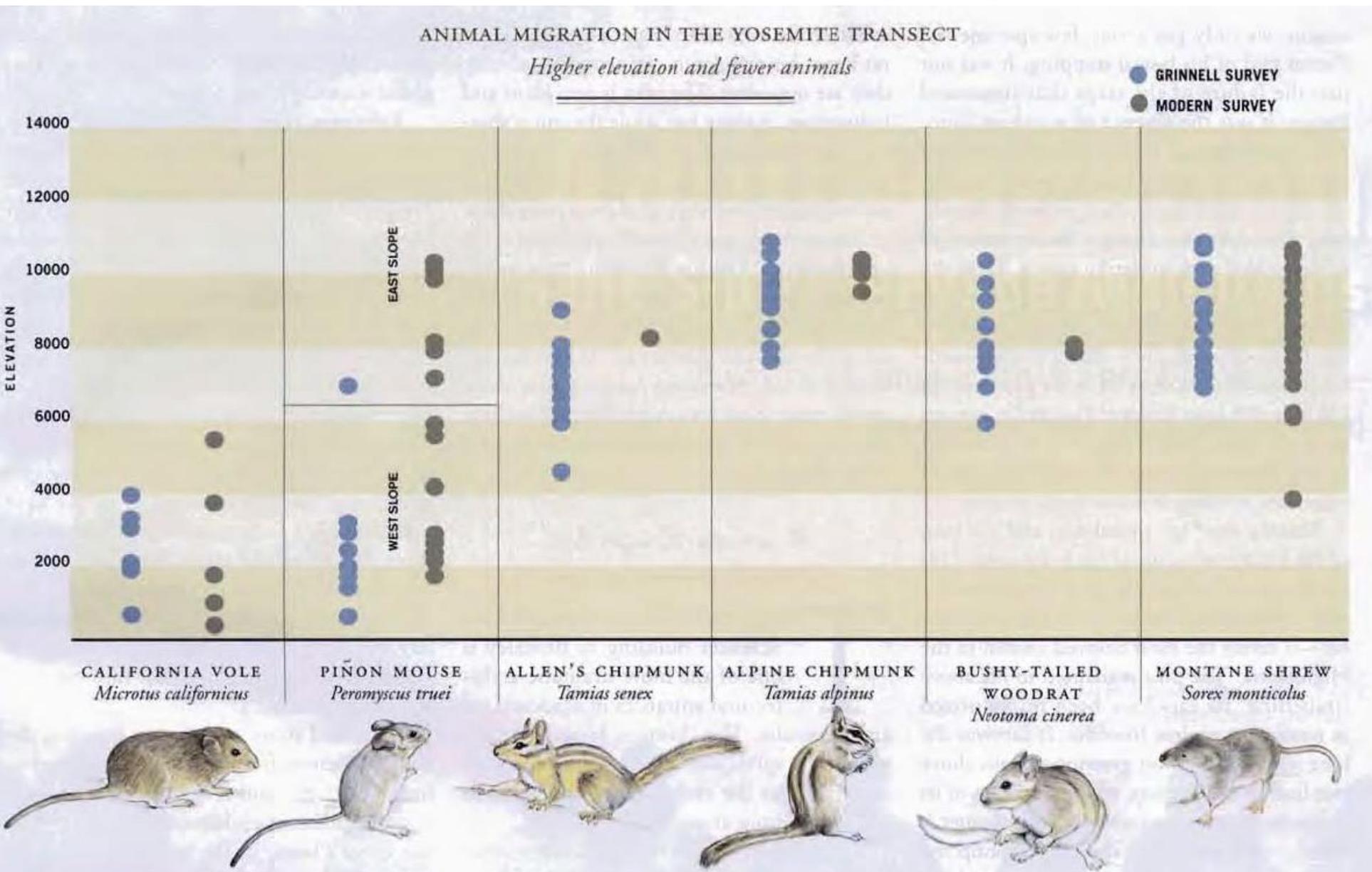
Range Shifts in Response to Climate Change?

Grinnell Yosemite Resurvey Project

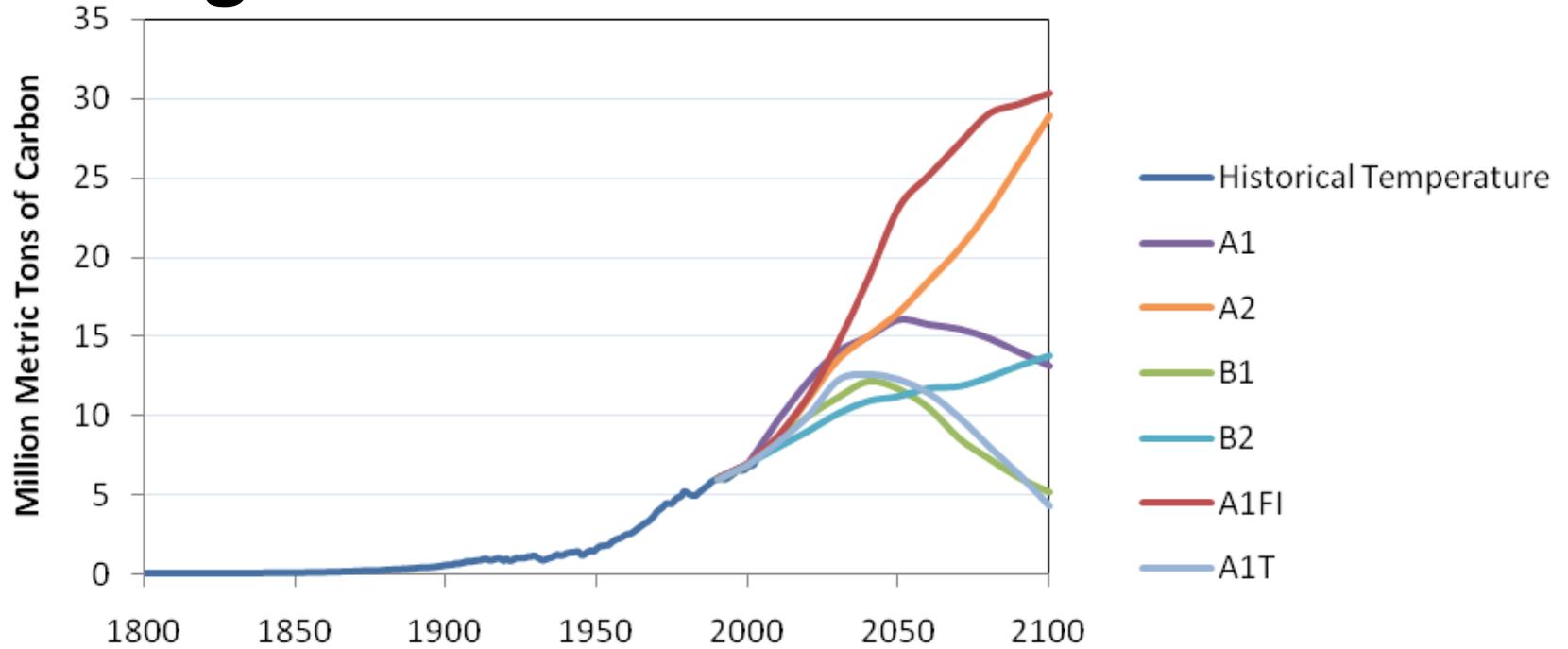


Moritz et al. 2002-2004

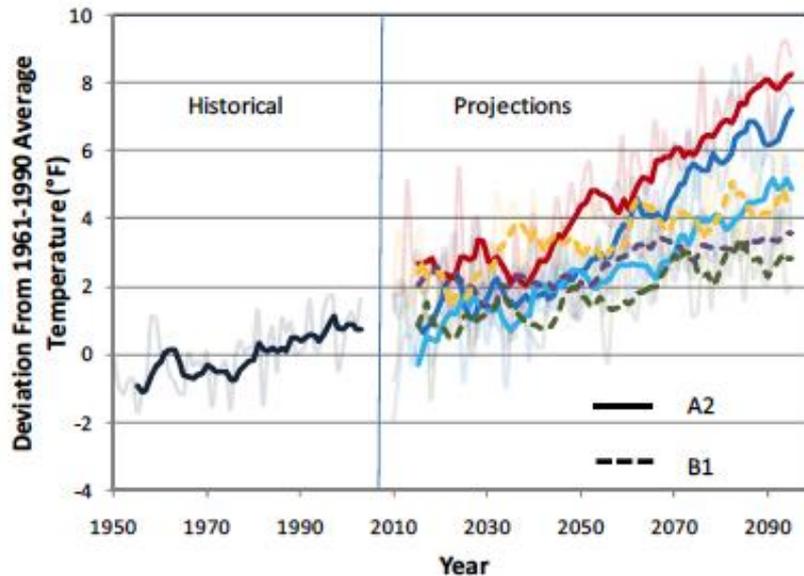
Grinnell Yosemite Resurvey Project



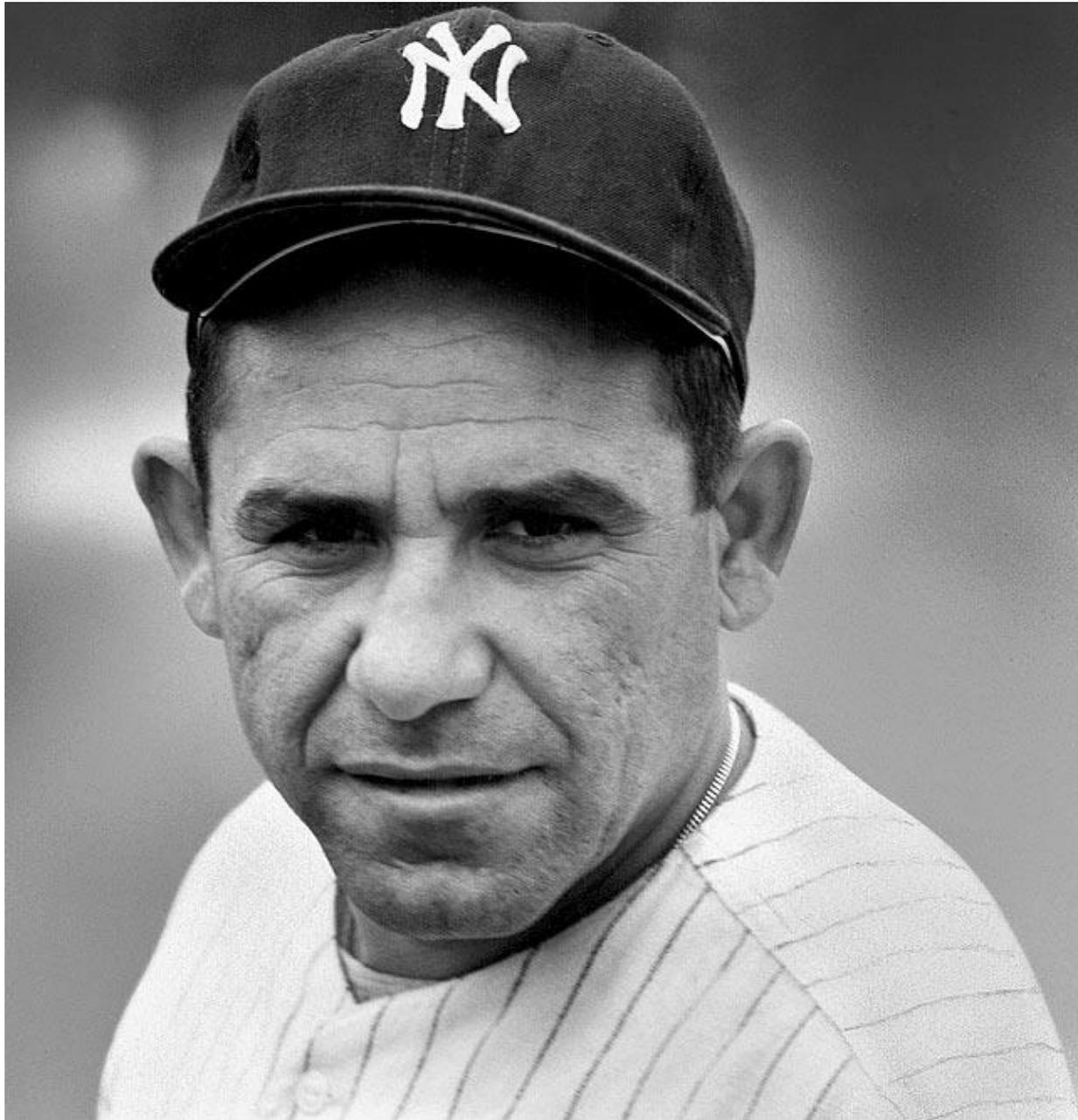
Forecasting the future...



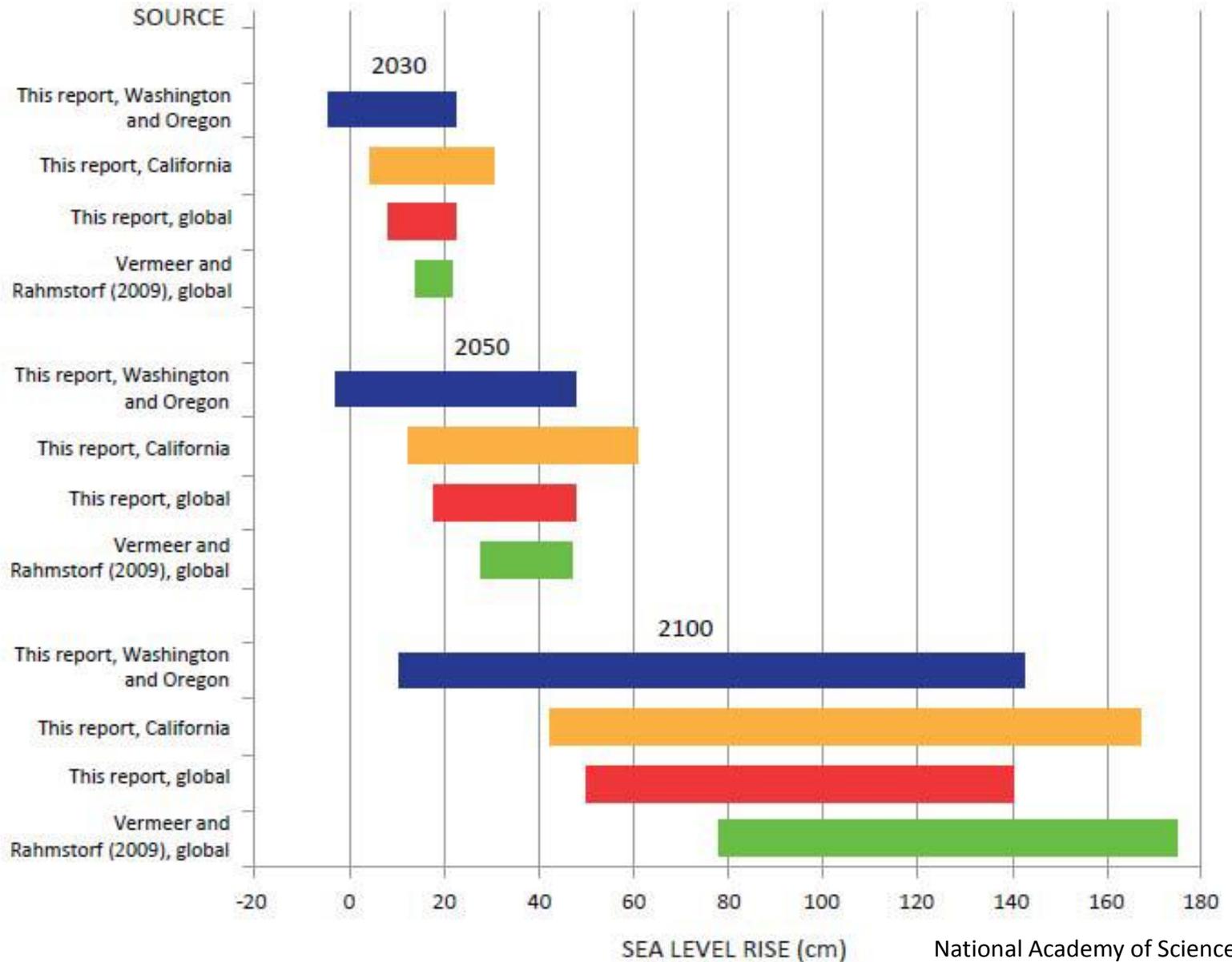
Marland et al. 2008 and IPCC



CA Energy Commission, 2009



Sea Level Rise



Preliminary Results: SLR Vulnerability



Sea Level Rise & Storm Surge Models



Silver Strand SB

+ 55 inch SLR & 100-year storm event



Malibu Lagoon SP

+ 55 inch SLR & 100-year storm event

Adaptation

Biodiversity

Strategy 1: Establish a System of **Sustainable** Habitat Reserves

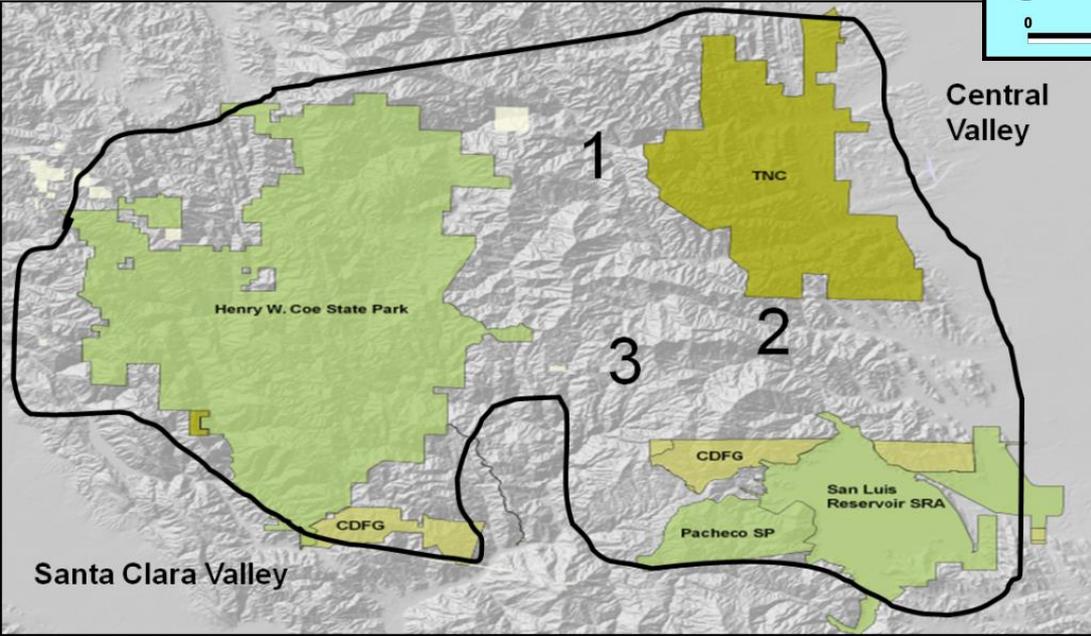
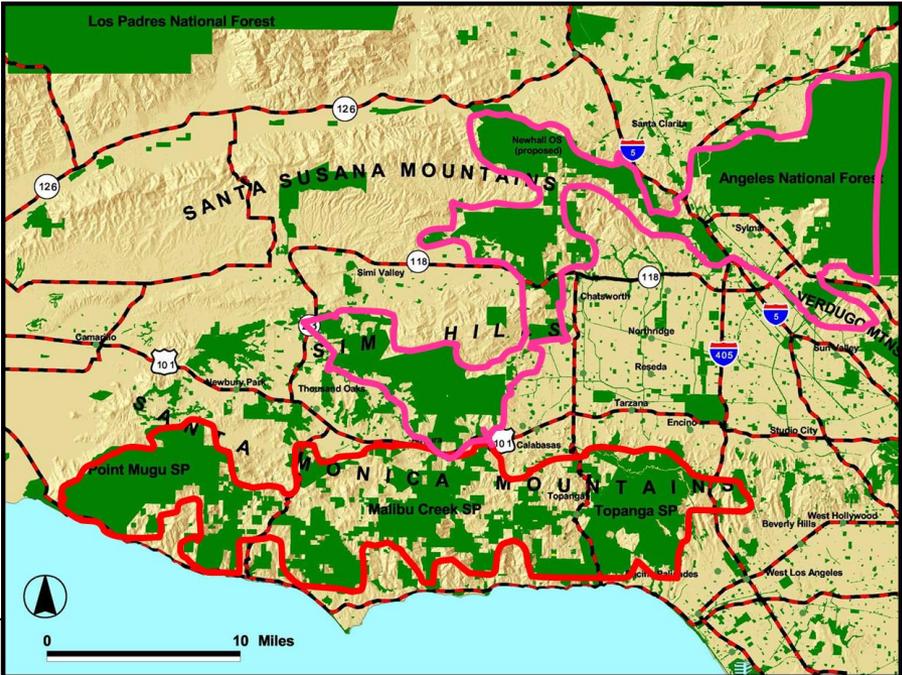
Strategy 2: Management of Watersheds, Habitat, and Ecosystem Restoration: Enhance ecosystem function and adaptive capacity of California's natural resource lands.

2009 CALIFORNIA CLIMATE ADAPTATION STRATEGY

A Report to the Governor of the State of California
in Response to Executive Order S-13-2008



Linking Protected Lands



Santa Monica Mountains

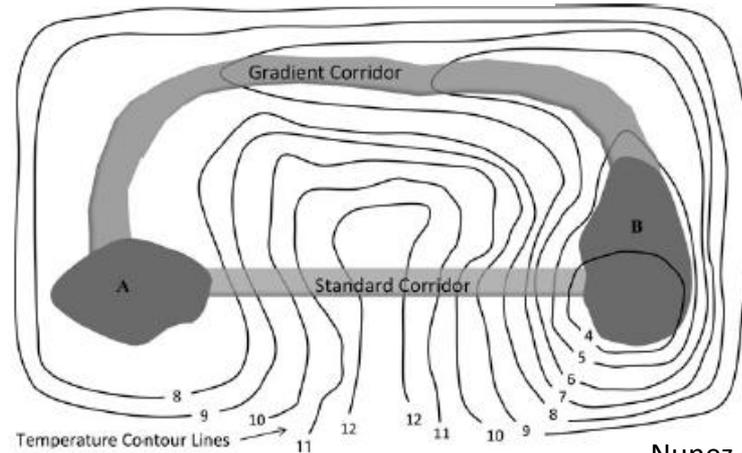
Design with Habitat Connectivity in Mind



From Concept to Map



From coarse to fine



CA Essential Habitat Connectivity Project, 2010

Nunez et al, 2013

Build Linkages Between Habitats



Riparian Corridors

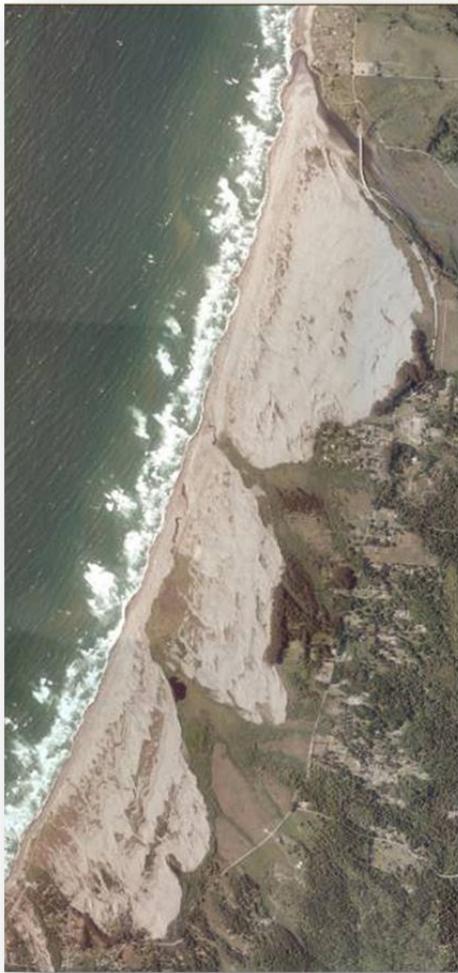


Wildlife Overpasses



Greenways

Rebuild Capacity to Adapt



California Coastal Records - 2009

Mackerricher State Park





Intervening in Ecological Change

Precipitation



Temperature



Changing
Climate

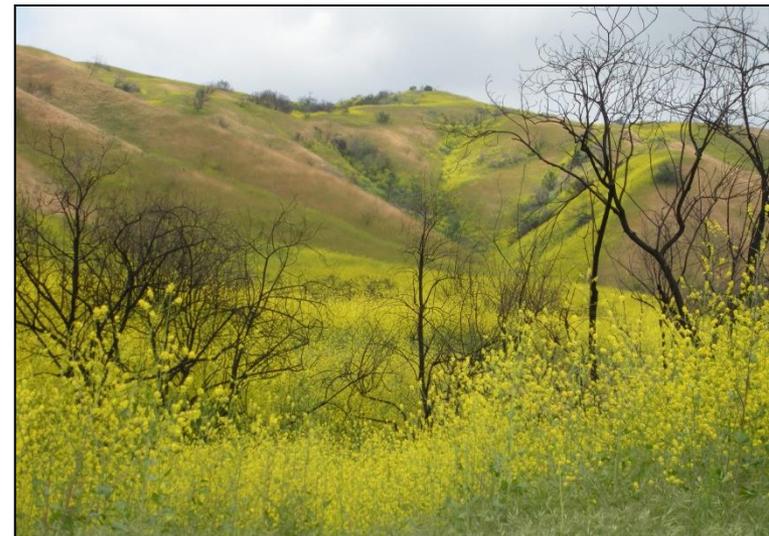


Altered
Ecological
Processes

Hydrology



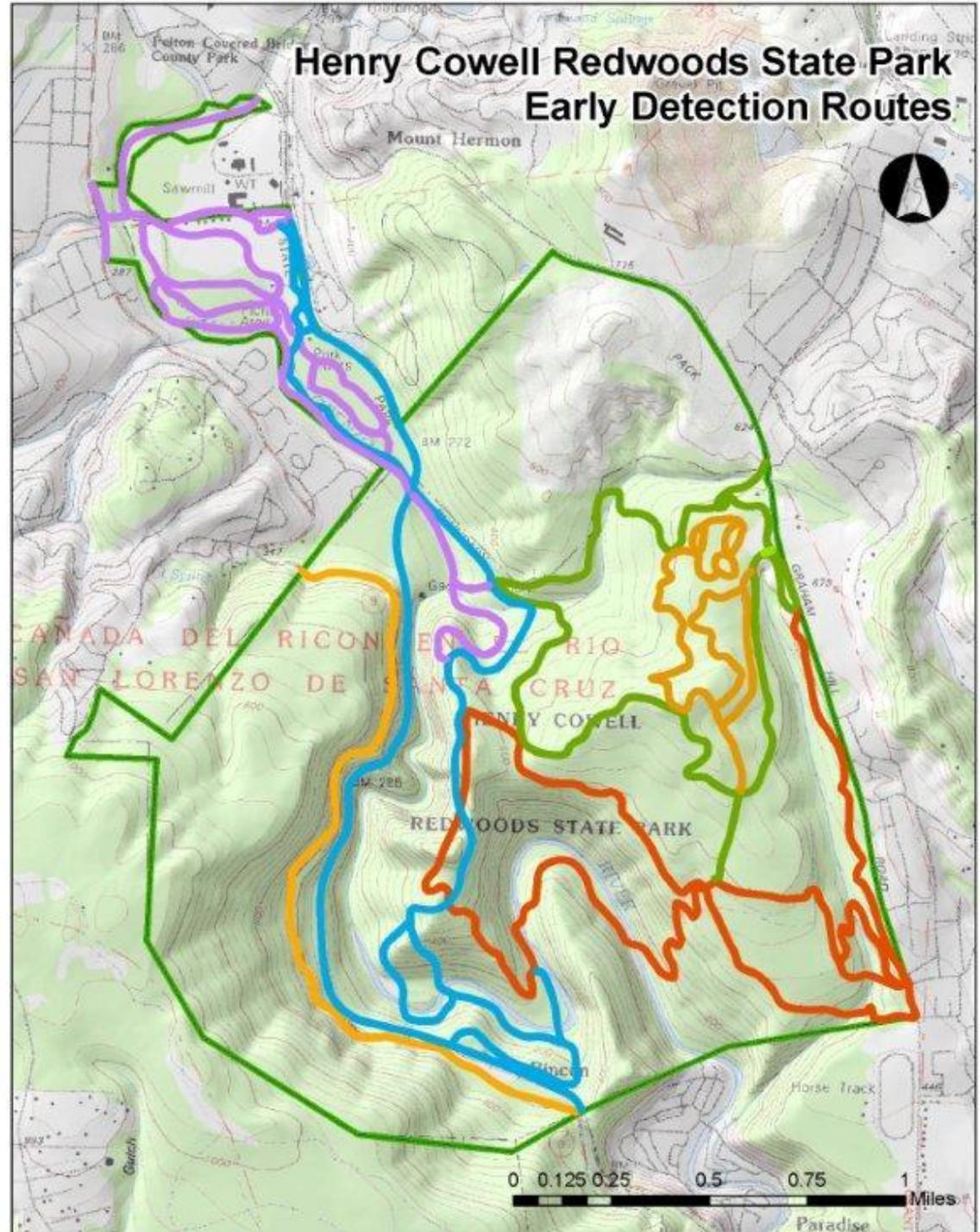
Fire



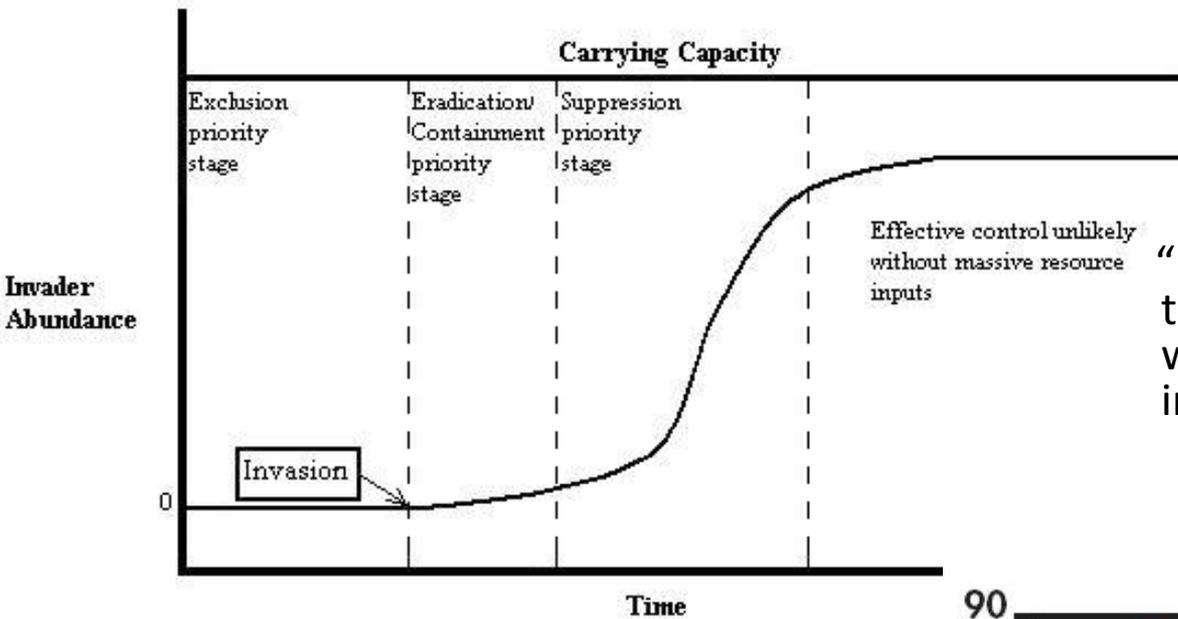
New
Priorities?

Early Detection & Rapid Response to new plant invasions

Where to look?

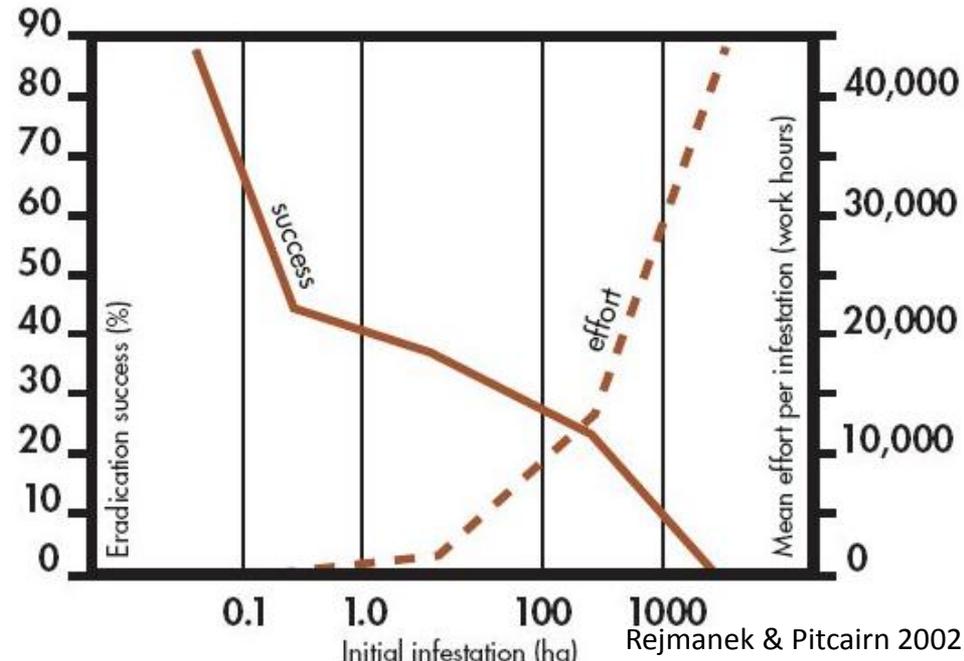


Why Early Detection?



Hobbs & Humphries 1995; Leung et al. 2002; Chornesky et al. 2005

“...following prevention, EDRR is the most efficient and effective way to minimize impacts from invasive species...”



Rejmanek & Pitcairn 2002



EDRR

TRAINING MATERIALS



EXOTIC SHRUB Himalayan Blackberry

(*Rubus armeniacus*)

Description

- Prickly, vine that can form impenetrable thickets 9 ft tall
- Leaves of 5 leaflets (sometimes 3) with white undersides
- 5-angled stem with stout, curved thorns
- Produces numerous black berries; birds and animals spread seeds
- Native to Europe

Bloom Period April—Aug

Habitat Grassland, Riparian, Scrub, or Forest



Don't confuse with...

California Blackberry

(*Rubus ursinus*) which has:

- Round, often whitish stem



Himalayan Blackberry stem is 5-angled with stout thorns



California Blackberry stem is round and whitish with many slender prickles

Image credits: Front top: © Michael Charters; all other images: NPS



EXOTIC SHRUB Red Sesbania

(*Sesbania punicea*)

Description

- Shrub or small tree to 13 ft tall
- 4-8 in leaves with 10-40 small, dark-green, drooping leaflets.
- Red flowers are held in dense clusters; seed pods are dark brown, 4-winged. Mature pods rattle when shaken.
- Spread along waterways or through horticulture.
- Native to South America

Bloom Period Mar–Sept

Habitat Riparian

Don't confuse with...

Black Locust

(*Robinia pseudoacacia*) with:

- White flowers
- Blooms earlier
- Has spines on stems
- Pods are flat
- Can be a large tree



Black locust flowers

Image credits: Front top: Bob Cass, Front center: Sulano WMA, Front bottom: Cali-PC, Back bottom: ©2000 Joe DiTomaso



EXOTIC HERB Yellow Archangel

(*Lamium galeobdolon*)

Description

- Fast growing ground cover
- Silvery-grey, oval, leaves are toothed, with white patterning.
- Flowers: yellow with "hooded" upper petal and "lipped" lower petal **streaked with red**.
- Spread along waterways or through horticulture
- Native to Europe

Bloom Period April-June

Habitat Riparian, Forest

Don't confuse with...

other mint plants (*Mentha pulegium* or *M. arvensis*) which have:

- No white pattern on the leaves
- White or blue flowers
- Strong minty odor



Mint plants with leaves absent of white veins

Image credits: Front top: ©2009 Phil Pullen; Front bottom: ©2007 Louis-M. Landry, Back top: ©2010 Barry Breckling; Back bottom: ©2011 Matte Brown

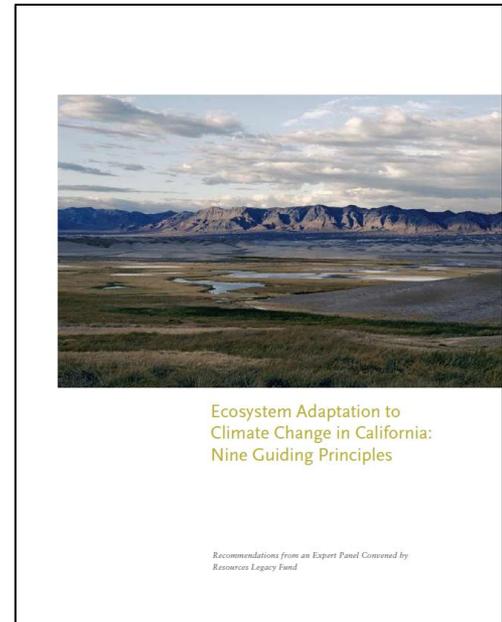
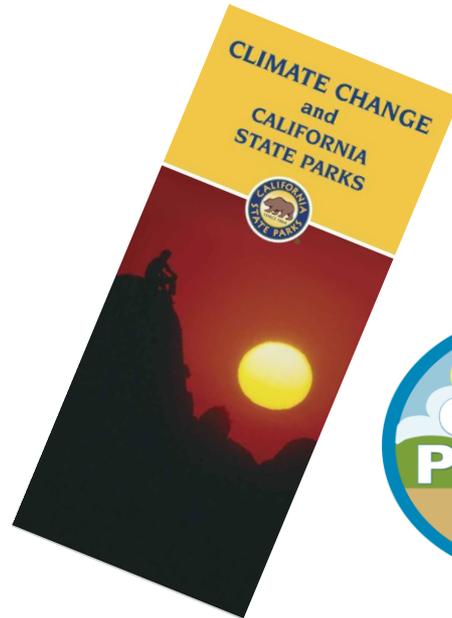
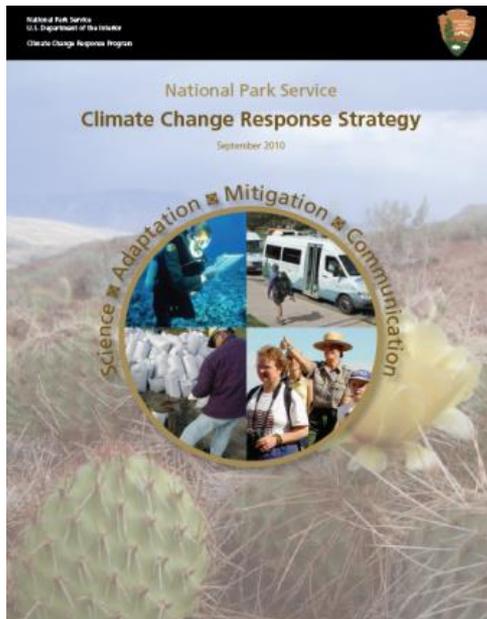
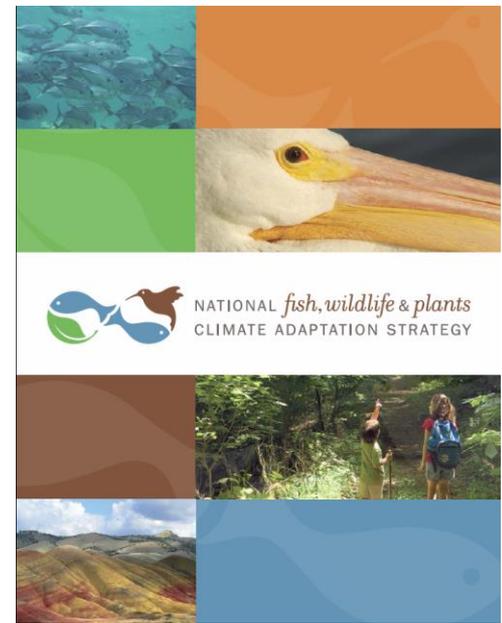
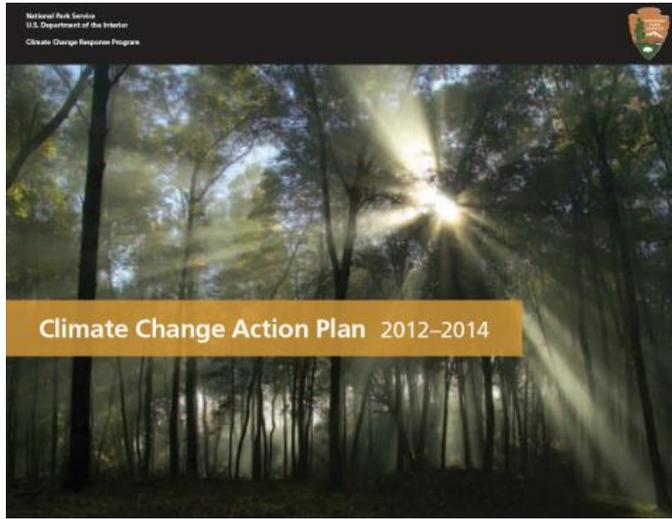


Federal Actions for a Climate Resilient Nation



Progress Report of the Interagency
Climate Change Adaptation Task Force

October 28, 2011

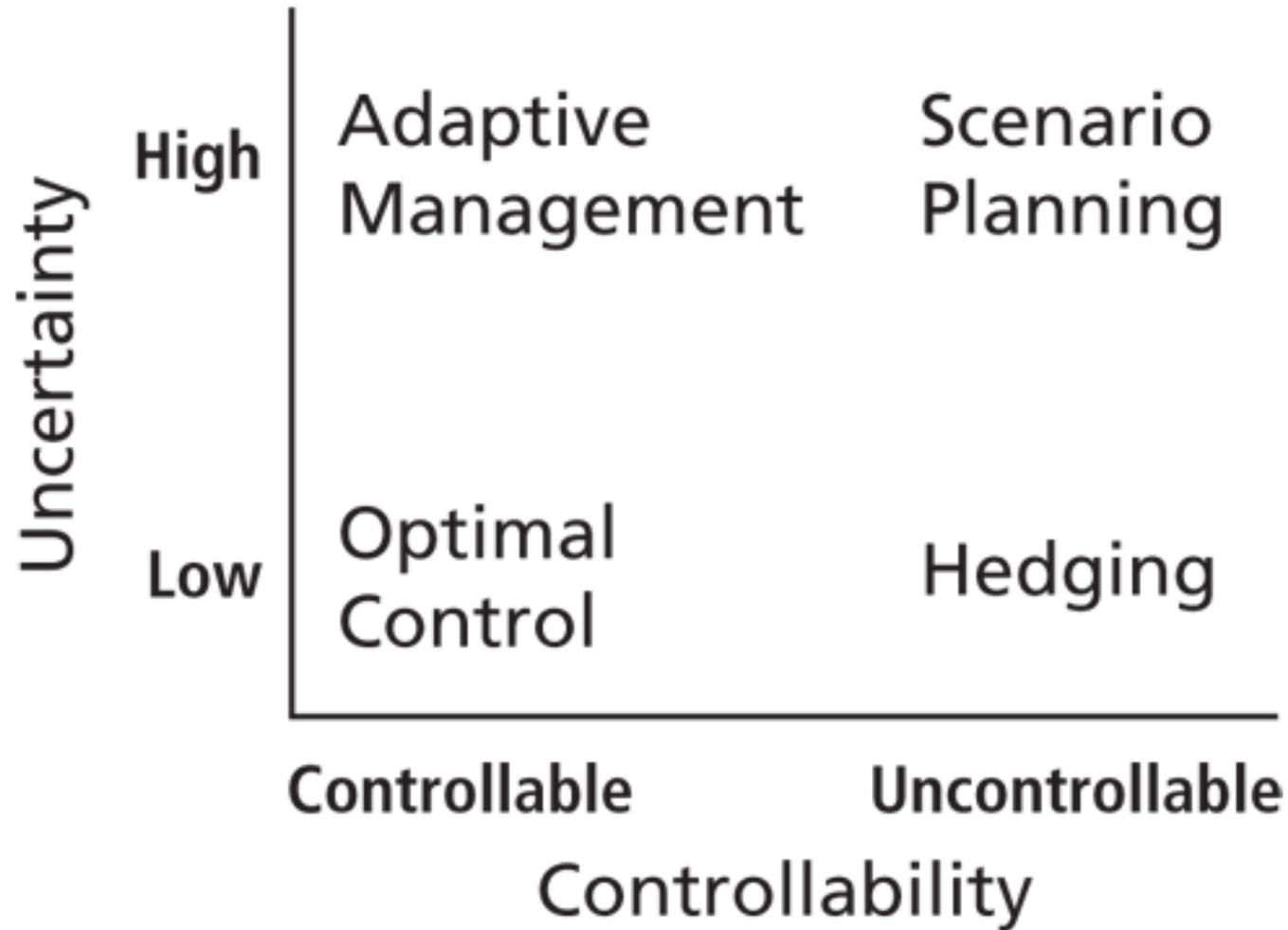


“Climate Smart” Considerations

- Focus on the future
- Address climate impacts in concert with other threats
 - Consider context
 - Build resilience
- Promote nature-based solutions to:
 - Minimize carbon footprint
 - Enhance ability to adapt
- Manage Adaptively
- Collaborate (across boundaries, jurisdictions, and disciplines)

Big Questions:

What actions are appropriate in the face of uncertainty?
How can we better cooperate across boundaries?
How can we better cooperate between silos?
What policies need to change?



National Park Service

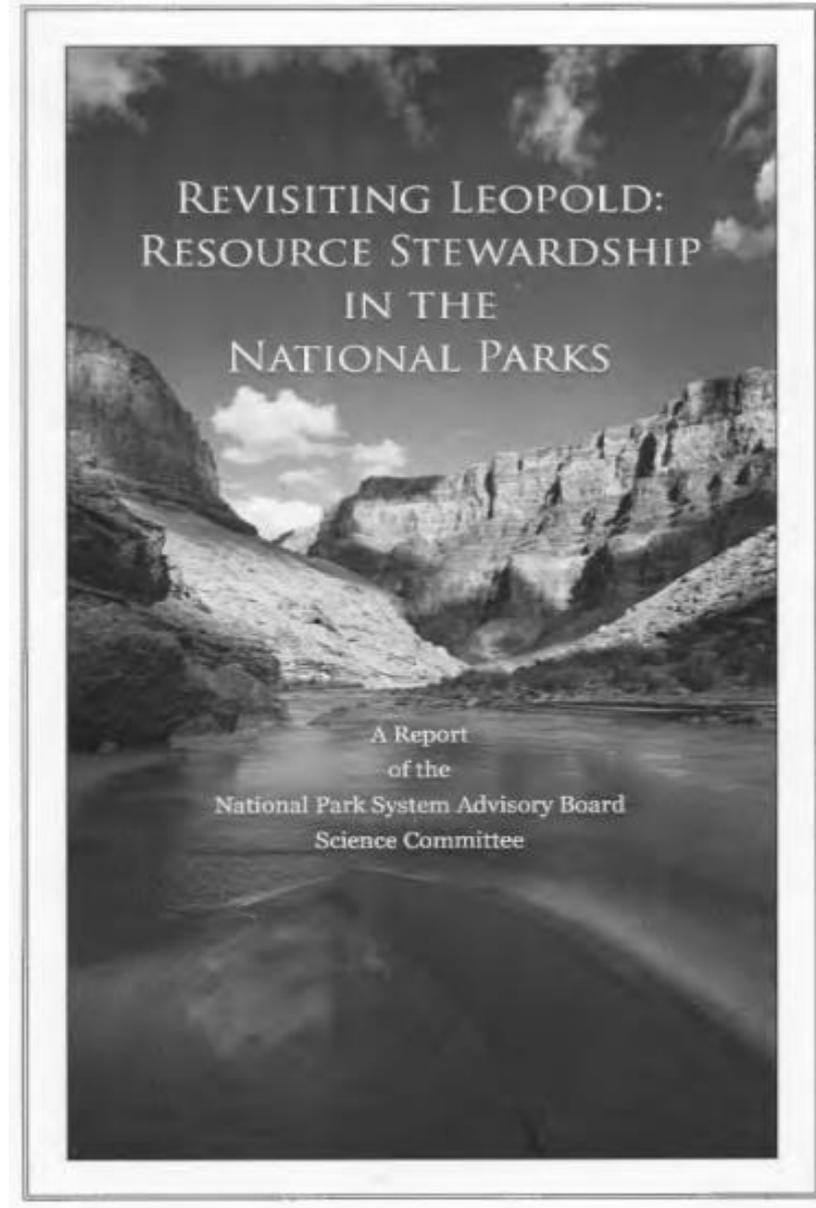
1963

As a primary goal, we would recommend that the biotic associations within each park be maintained, or where necessary recreated, as nearly as possible in the condition that prevailed when the area was first visited by the white man. A national park should represent a vignette of primitive America.

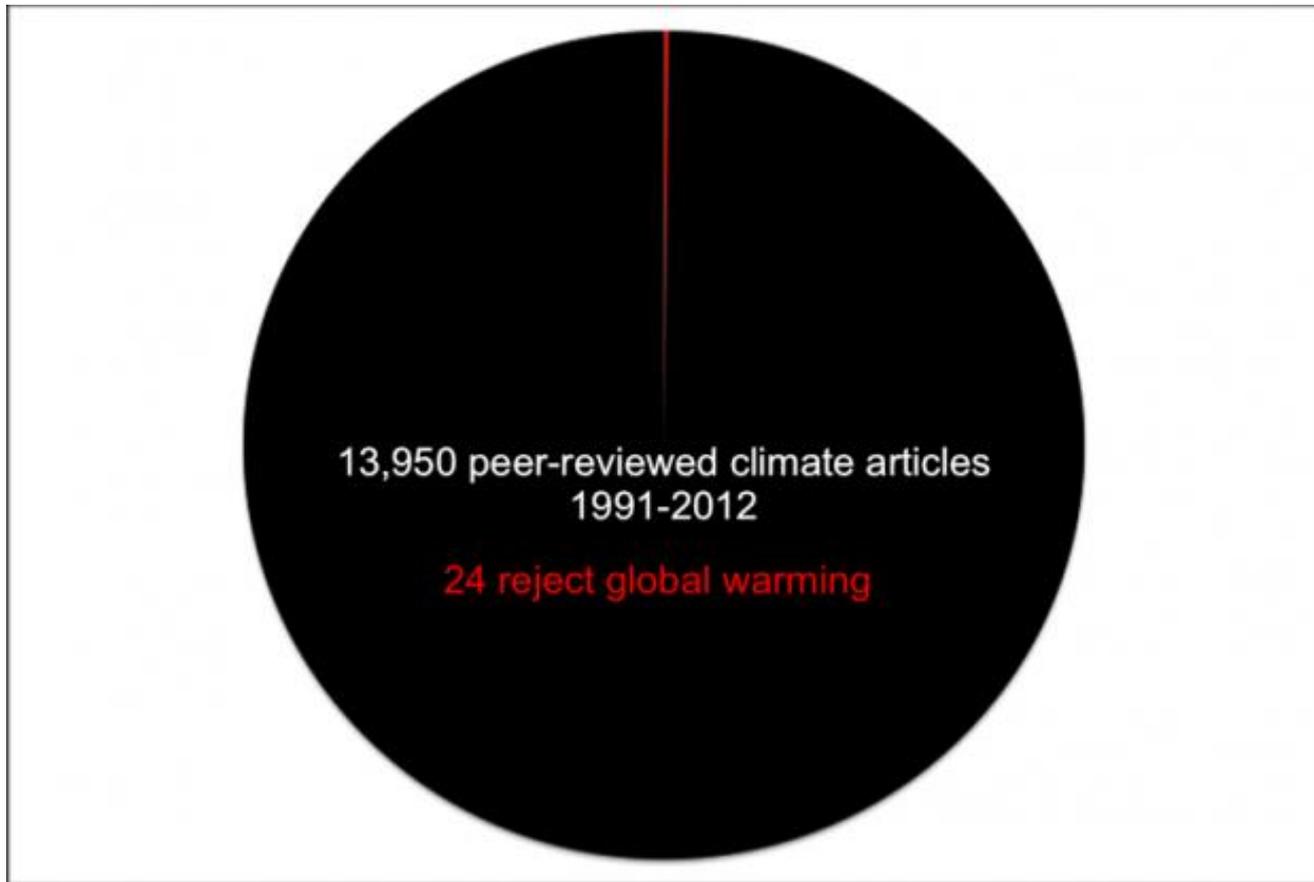
Wildlife Management in the National Parks, S Leopold et al

National Park Service 2012

The overarching goal of NPS resource management should be to steward NPS resources for continuous change that is not yet fully understood, in order to preserve ecological integrity and cultural and historical authenticity, provide visitors with transformative experiences, and form the core of a national conservation land- seascape.



Climate Change “Debate”



Modeling the Future: Sierra Nevada Snowpack

